

Article

Climate change and maritime security narrative: the case of the international maritime organisation

Germond, Basil and Ha, Fong Wa

Available at <http://clock.uclan.ac.uk/24616/>

Germond, Basil and Ha, Fong Wa ORCID: 0000-0002-7728-1141 (2018) Climate change and maritime security narrative: the case of the international maritime organisation. Journal of Environmental Studies and Sciences . pp. 1-12. ISSN 2190-6483

It is advisable to refer to the publisher's version if you intend to cite from the work.

For more information about UCLan's research in this area go to <http://www.uclan.ac.uk/researchgroups/> and search for <name of research Group>.

For information about Research generally at UCLan please go to <http://www.uclan.ac.uk/research/>

All outputs in CLoK are protected by Intellectual Property Rights law, including Copyright law. Copyright, IPR and Moral Rights for the works on this site are retained by the individual authors and/or other copyright owners. Terms and conditions for use of this material are defined in the [policies](#) page.



Climate change and maritime security narrative: the case of the international maritime organisation

Basil Germond¹ · Fong Wa Ha¹

© The Author(s) 2018

Abstract

Both climate change and maritime security are currently ranking high on states' and international organisations' political and governance agendas. However, academics and practitioners alike have hardly tackled the actual interlinkages and dependencies between the two issues. Taking the International Maritime Organization (IMO) as a case study, this article pioneers the use of corpus linguistic method to unravel the nonexistence of a narrative linking climate change impacts and the occurrence of maritime criminality despite some connections in practice. However, direct narrative links between climate change and migration as well as migration and maritime security were found, which can point at an indirect link between climate change and maritime security. The article concludes on the implications of these findings for academics and practitioners alike. The latter are encouraged to reflect on their current narrative in a bid to contribute to a better acknowledgement of the existing links between the impacts of climate change on natural and human systems and aspects of maritime security.

Keywords Global warming · Maritime criminality · Migration · IMO · Discourse · Corpus linguistics

Introduction

Since the turn of the twenty-first century, political actors such as states and international organisations have developed and promoted a discourse that links climate change and security (e.g. Commission of the European Communities 2009; UN Security Council 2007; Department of Defense 2015). The extent, significance and practical implications of this discourse have generated many academic studies (e.g. Parsons 2010; Scott 2008, 2012; Trombetta 2008; Von Lucke et al. 2014; on the actual links between climate change and security, see notably Barnett 2003; Barnett and Adger 2007; Gemenne et al. 2014; Gleditsch 2012; Hsiang and Burke 2014; Scheffran et al. 2012). At the same time, the expansion of the security agenda and 9/11 have generated fears about the power of nuisance of non-state actors operating at sea, such as terrorists, pirates, smugglers and even illegal fishers (e.g. African Union 2012; Council of the European Union 2014; French Government 2015; HM Government 2014). The upsurge of piracy at the Horn of

Africa in 2007/08 has also strengthened this trend. This has resulted in a growing narrative emphasising the need to control ocean space (Germond 2015), which translates into maritime security practices by states and international organisations, such as counter-piracy and counter-human smuggling operations, maritime surveillance and the adoption and implementation of dedicated norms and regulations.

Despite the existence of a narrative on climate change and security and a narrative on maritime security at the highest level of decision-making, there is currently no known/visible narrative linking climate change impacts and the occurrence of maritime criminality. Academics and practitioners alike seem to have somewhat neglected the actual interlinkages between the two sets of issues. In other words, the links and dependencies between climate change and maritime security have not been the focus of many studies (rare examples include Cordner 2010; Jaspardo 2009; Jaspardo and Taylor 2008; Kaye 2012; Mazaris and Germond 2018; Rahman 2012; Rahman and Tsamenyi 2010). Against this backdrop, this article aims to unravel the extent to which this narrative is indeed absent from political discourses or whether there are embryonic signs of its development. To clarify this matter, we carry out a hybrid corpus and discourse analysis of the International Maritime Organisation (IMO) public documents/website (c.f. methodology section for a justification of the case study).

✉ Basil Germond
b.germond@lancaster.ac.uk

¹ Department of Politics, Philosophy and Religion, Lancaster University, Lancaster LA14YL, UK

The main research question consists in searching the extent to which a narrative linking climate change and maritime security/criminality can be found in the IMO textual production. Then, if this narrative exists, how is the relationship conceptualised/presented? Can we find some ‘vectors’ linking climate change and maritime criminality, such as coastal populations’ vulnerability or sustainable development? If it does not exist, then how to explain the absence of such a discourse? How does the conceptualisation of climate change on the one hand and of maritime security on the other hand contribute to this lack of interlinkages in narrative? The findings will contribute to the academic effort consisting in fostering the recognition of complex interlinkages between climate change and maritime security, while helping practitioners reflecting on their priorities and on the extent to which they frame their responses to the two issues in a separate way.

Methodology

A corpus linguistics approach has been considered as the most relevant approach for the research question, since it allows demonstrating narrative trends beyond the existence of disparate sentences and in a systematic way, reducing “the rich chaos of language [to its] boiled down extract” (Scott and Tribble 2006: 6). Quantitative data such as frequency lists and statistics can be extracted from the dataset, which allows demonstrating the existence or absence of narrative patterns and highlighting their particular linguistics characteristics. Billions of words can be processed meaning that the entire textual production of a given actor can be analysed, revealing patterns that would hardly be discernible otherwise.

The corpus of this study is sourced from the published IMO documents (freely available on the organisation’s public website). We chose this organisation because the IMO is the leading international institution which deals with maritime affairs. It has interests and competencies in both climate change at sea and in maritime security issues. The IMO describes itself as “the global standard-setting authority for the safety, security and environmental performance of international shipping. [Its] main role is to create a regulatory framework for the shipping industry that is fair and effective, universally adopted and universally implemented” (IMO website-About). In other words, the IMO is a regulatory and policy setting institution. Both “sustainable maritime development” and “maritime security” are ranked high on its agenda (ibid). Therefore, the IMO website is a suitable and representative source for a small-scale pioneer research project like the present study, which explores the linkages between climate change and maritime security.

To investigate these linkages, we looked at the collocations of the node words, i.e. the search words, related to these two issues. The concept of collocation in corpus linguistics has

been researched for at least 60 years. It was first introduced as a technical term by Firth (1957), who later defined collocation as “statements of the habitual or customary places” (Firth 1968: 181) of a given word. To date, Firth’s view that collocation is a frequent co-occurrence of patterns of two lexical items has been widely accepted by corpus linguists (e.g. Sinclair 1991; Hoey 1991; Stubbs 1995; Hunston 2002; McEnery et al. 2006).

As this study aims to look at how strongly climate change is linked to maritime security in the IMO textual production (c.f. below for a discussion of the building of the corpus), it is fundamental to examine how frequent node words of one group co-occur with node words of another group (e.g. *climate change* vs. *maritime security*) in the corpus collected. In other words, the connections between individual collocates should be determined.

We have manually created a dataset with all documents and webpages containing references to both climate change (or global warming) and maritime security (or maritime criminality, piracy, illegal fishing, etc.). As the discussions which connect security and the maritime domain beyond naval developments only started at the turn of the new millennium (Bueger 2014; Germond 2015), we have only included documents and webpages dated after year 2000. Some documents, which were irrelevant to the study and created ‘noise’, have been manually removed from the corpus: technical guidelines, promotional documents, organisational procedures, policies, and action plans, lists of internet links to sources of information and Powerpoint presentation slides. The final corpus contains 1419 documents and webpages, with a total of 3,705,927 tokens obtained. For the purpose of this analysis, “token” is roughly equivalent to “word”.

After the corpus has been constructed, we carried out a manual qualitative analysis on a sample of randomly selected files from the corpus, so as to identify and select a list of relevant node words relating to *climate change* or *maritime security*. We also found a few common words of non-criminal maritime issues, i.e. pollution, accident and environmental protection, to serve as the control group. These node words are listed in Table 1.

In the starting phase, we formed all possible word pairs by pairing a node from the climate change group and a node from the maritime security group. For example, *climate change* and *maritime security*, *climate change* and *unlawful acts*, *global warming* and *piracy*, etc. As a control measure, we also paired up nodes from the climate change group with nodes from the non-criminal group. Collocations of these control pairs were examined as well.

To proceed with corpus analysis, we used LanksBox, which is a newly developed software and one of the very few corpus linguistics tools which supports the investigation of collocation in context, i.e. collocation networks. It visualises the collocations in the form of graphs of the network of

Table 1 Selected node words relating to climate change or maritime security

'Climate change' group	'Maritime security' group	Control group
Climate change*	Maritime security*	Pollution*
Climatic change	Maritime cyber security	Maritime accident*
Global warming	Maritime cyber risk*	Marine environmental protection*
	Maritime criminality	
	Unlawful acts*	
	Piracy*	
	Armed robbery*	
	Human trafficking*	
	Smuggling*	
	Illegal fishing	
	Counter-terrorism*	

Node words with an asterisk are the restricted ones

words that collocate with each node word; by this means, the relationship between a node word and its textual environment can be revealed (Brezina et al. [in prep](#); Brezina et al. 2015). Few other corpus linguistics tools, for example Wordsmith Tools (<http://www.lexically.net/wordsmith/>), also enable the building of collocation networks. However, the process involves mainly manual comparison of the associations between the keyword and its collocates (ibid). LancsBox, on the other hand, builds the networks automatically and therefore is ideal for the present study, which investigates predominantly the collocation networks formed by the two groups of node words relating to *climate change* and *maritime security*. It enables us to have an insight into lexical interconnections between the two topics.

Based on the word pairs of Table 1, we first identified collocates to each node, which are the words that co-occur with the node. We then used the mutual information (MI) statistic to choose the most pertinent words nodes by selecting a cut-off frequency of 5, a cut-off statistical value of 6 and a span of ± 5 words regardless of punctuation. The cut-off frequency is the number of times the token appears in the corpus for it to be included in the graph. For this study, any token with a frequency below 5 is considered too rare to be taken into consideration. The collocates must be within a span of five words to the left or right of the keyword. The associate measure MI score is a common measurement tool used in corpus linguistics. It is used for this research because it favours strongly related low-frequency collocates (e.g. displacement, risk, etc.) over highly frequent but loosely associated collocates (e.g. the, in, of, etc.). Application of the method described above led to remove from the search nodes of Table 1 those with none or very few collocates. The final node words retained are asterisked in Table 1.

Finally, using LancsBox GraphColl function, we investigated whether the narrative demonstrates a causality link (or at least a link) between the impacts of climate change at/or from the sea and the occurrence of maritime criminality/maritime

security issues. We started by independently analysing the main collocates of *climate change* and *maritime security*, so as to get a picture of both narratives separately. We then tried to find out how *climate change* and *maritime security* were interrelated including through an indirect link between climate change and maritime security such as via the discussions of (illegal) migration. The complete methodology is summarised by the organigram of Fig. 1.

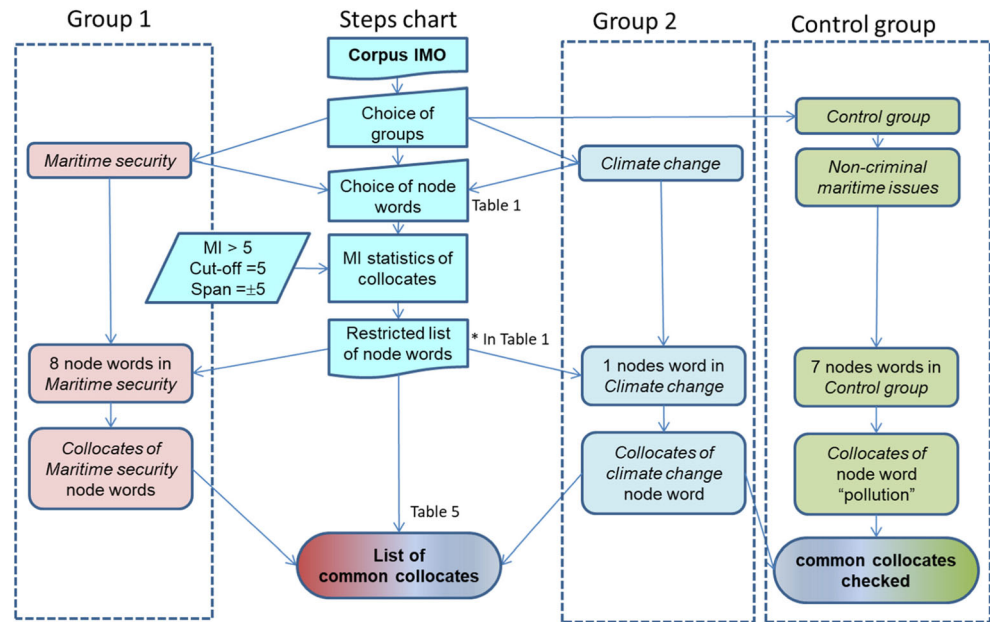
Data and analysis

We first used the GraphColl function of LancsBox to search for the collocates of each node word listed in Table 2. GraphColl visualises how strong the collocation is, how frequent the collocates appear, as well as the position of the collocates. This was performed in three steps:

Step 1: Collocates of climate change

Figure 2 shows the visualisation of the collocates of *climate change*. Collocates which are closer to the node word are stronger than the ones that are further apart. Collocates with a darker colour in the dot are more frequent than the ones with a lighter colour. The positions (R or L) of the collocates on the graph echo their positions on the concordance lines as well. Concordancing is “a means of accessing a corpus of text to show how any given word or phrase in the text is used in the immediate context in which it appears” (Flowerdew 1996, p.87). A concordance line is a line from a text of the corpus which contains the node word to be studied. Data show that climate change in the IMO narrative is mainly associated with (1) institutional processes/frameworks (e.g. <cop>, <conference>, <unfccc>, <framework>, <united nations>) and (2) policy requirements/settings (e.g. <adaptation>, <mitigation>, <address/addressing>, <responding>, <reduce>, <combat>, <urgent>). This fits with the technical discourse adopted by international organisations in the field of

Fig. 1 Diagram of the corpus linguistics methodology used (The column designed as Group 1, resp. Group 2, resp. Control group represents the Maritime security group, resp. the Climate change group, resp. the Non-criminal maritime issues control group. The column ‘Steps chart’ displays the successive steps of the method to obtain a list of common collocates.)



environment and development (e.g. Ferguson 1990) as well as a tendency to favour short-term, problem-solving approaches.

Four interesting collocates appear when it comes to negative impacts of climate change: <disaster>, <gender>, <displacement> and <migration>. Disaster may refer to the effects of climate change on natural ecosystems but also on human systems, since an increased frequency of natural disasters (especially in the poorest regions of the world) can negatively

impact on human security via health and food supply issues. Also, extreme weather events and disasters can damage the maritime economy and negatively impact on food security (Allison et al. 2009). The reference to gender issues may well point at the supposed gender dimension of the impacts of climate change, i.e. women are either more vulnerable to these effects or, on the contrary, better prepared to respond to these changes (for a critical discussion of these propositions, see

Table 2 Statistics of the collocates of *climate change*

Position	Collocate	MI score	Frequency (coll.)	Frequency (corpus)
R	warming	12.37	17	30
R	adaptation	11.96	18	42
R	cop	11.79	11	29
R	unfccc	11.64	12	35
R	mitigation	11.46	26	86
R	degradation	11.41	12	41
L	paris	10.50	22	141
L	mitigate	10.40	15	103
L	atmospheric	10.24	10	77
R	displacement	9.62	6	71
L	debate	9.34	15	215
L	combat	9.30	11	163
L	disaster	9.04	7	124
R	impacts	8.99	17	311
R	goal	8.44	9	242
L	urgent	8.32	6	175
L	responding	8.17	5	162
L	gender	8.06	6	210
L	framework	8.02	36	1294

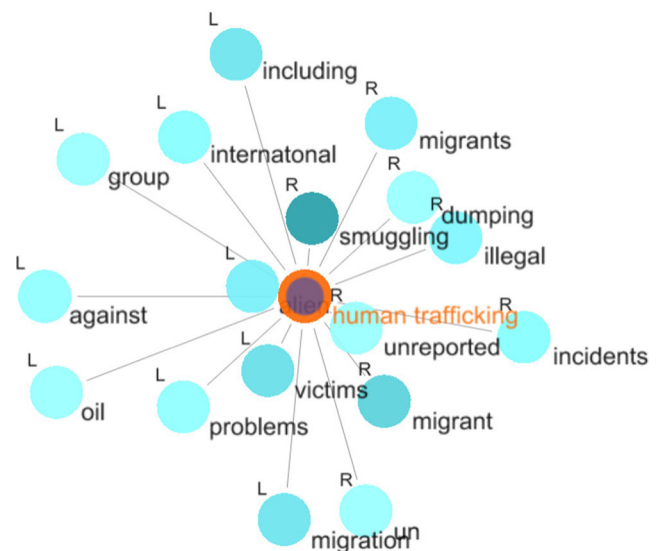
Only collocates with MI > 8 are shown. Underlying data source: IMO public website

Table 3 Statistics of the collocates of *maritime security*

Position	Collocate	MI score	Freq (coll.)	Freq (corpus)
R	msf	11.44	9	9
R	l(h	11.29	9	10
R	table-top	10.96	5	7
L	balancing	10.95	57	80
R	pmscs	10.66	7	12
R	freedom	10.43	57	115
L	sub-division	10.32	11	24
L	multi-agency	10.16	7	17
R	msc/circ.1072	9.76	5	16
L	vietnam	9.76	19	61
L	enhancement	9.75	54	174
L	enhance	9.56	226	835
L	underpinned	9.52	5	19
R	contractors	9.32	11	48
L	imo-led	9.30	5	22
L	trelawny	9.15	9	44
R	xi	9.02	8	43
R	msc.159(78	9.01	5	27
L	a.924(22	8.96	5	28
L	pertaining	8.91	19	110
R	trust	8.84	35	212
R	horn	8.80	22	137
R	mschoa	8.73	14	92
R	pmsc	8.68	15	102
L	heightened	8.52	9	68
L	innovation	8.41	17	139
R	operative	8.34	12	103
R	counter-piracy	8.18	10	96
R	offering	8.15	5	49
R	contracted	8.12	19	190
L	central	8.06	42	438

Only collocates with MI > 8 are shown. Underlying data source: IMO public website

common collocate. Logically, one of the node word pairs, *climate change* and *maritime cyber risk*, had no common collocates at all. The rare common collocates show a common emphasis on the institutional framework (<UN>, <united nations>, <framework>, <global>) and on the need to do something in a proactive way (<combat>). The most relevant common collocate (also found in Tables 3 and 4) was found in the *climate change* and *human trafficking* node word pair: <migration>. Indeed, as mentioned above, migration (and displacement) is also a collocate of climate change. Thus, the only occurrence of an indirect link between climate change and maritime security can be found via migration. The literature has suggested that climate change (negatively) impacts on food security and population well-being, then potentially generating (illegal) migration or human trafficking, with migrants travelling (or being

**Fig. 4** Graph for the collocates of *human trafficking*

trafficked) by sea (Jasparro and Taylor 2008; Kaye 2012), thus a link to maritime criminality and maritime security issues.

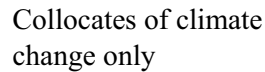
Figure 6 shows a graph of common collocates between *climate change* and *migration*. In addition to the direct collocation between climate change and migration, common collocates do not indicate any more precise connection with maritime security. Building on this, Fig. 7 shows the concordances of some common collocates (i.e. <displacement>, <degradation>) between *climate change* and *migration* adding a qualitative insight. Examples of concordance tend to corroborate

Table 4 statistics of the collocates of *human trafficking*

Position	Collocate	MI score	Freq (coll.)	Freq (corpus)
L	alien	13.16723	9	49
R	unreported	12.93395	5	32
R	<i>smuggling</i>	<i>12.34633</i>	<i>34</i>	<i>327</i>
L	victims	12.18575	12	129
R	<i>migrant</i>	<i>10.57933</i>	<i>15</i>	<i>491</i>
R	dumping	10.08845	5	230
R	illegal	9.597995	8	517
L	problems	9.50698	6	413
R	<i>migrants</i>	<i>8.554325</i>	<i>9</i>	<i>1199</i>
L	international	8.343891	7	1079
R	incidents	7.58569	7	1825
R	un	7.574194	5	1314
L	<i>migration</i>	<i>7.536172</i>	<i>11</i>	<i>2968</i>
L	including	6.638122	11	5531
L	against	6.357774	6	3664
L	group	6.335426	5	3101
L	Oil	6.151764	5	3522

Lines in italics refer to the most frequent collocates. Underlying data source: IMO public website

Collocates of counter-terrorism only



Common collocates between climate change and counter-terrorism

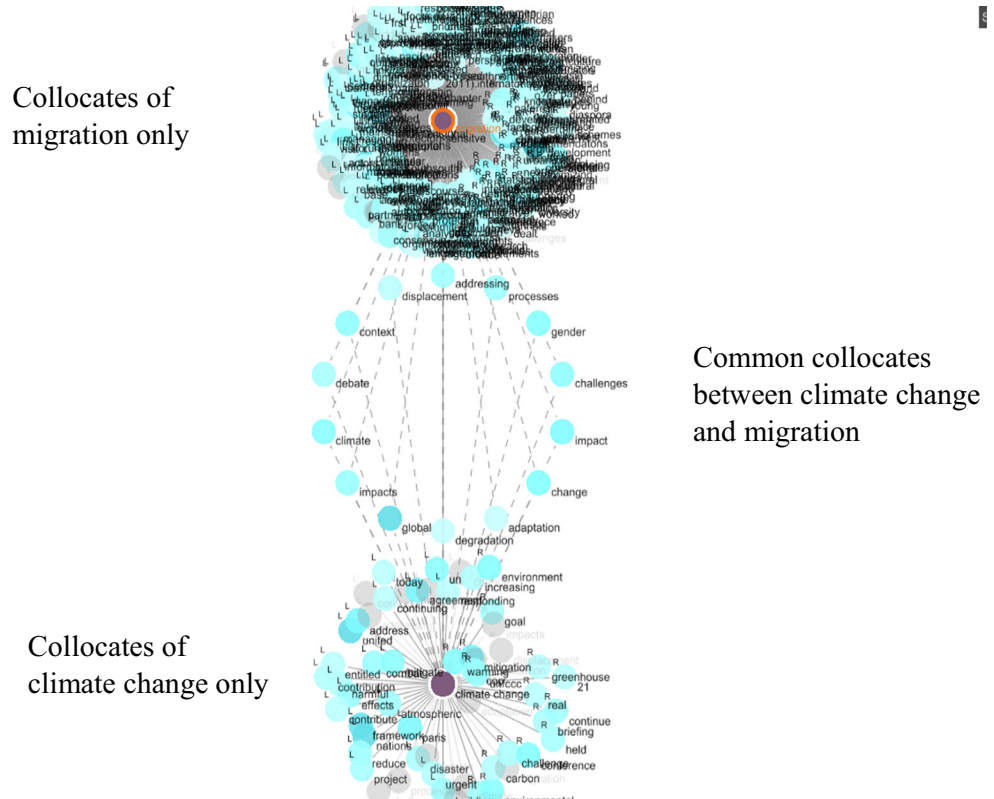
change and maritime security. Figure 8 and Fig. 9, for example, present the concordance lines of *combat*, a common collocate of *climate change* and *armed robbery/smuggling*. None of the concordance lines show a link between *climate change* and *armed robbery/smuggling*, beyond the fact that the word <combat> is anyway used in two different lexical contexts, i.e. dealing with the threats posed by real criminals versus dealing with the negative impacts of climate change.

On the other hand, however, links were observed between *climate change* and the node word *pollution* in the control group, which contains the node words related to non-security (i.e. safety) maritime issues. As we checked the concordance lines of the common collocates presented in Fig. 10 (i.e. <reduce>, <harmful>, <responding>, <warming>, <environment>, <atmospheric>), *climate change* and *pollution* were both linked to harmful environmental effects. For example, Fig. 11 shows the concordance lines of *environment*, a common collocate of *climate change* and *pollution*, in which climate change is directly addressed as a threat to the environment, in the same way pollution is. This confirms that there seems to be a stronger narrative link between climate change and non-security maritime issues, although connections between *climate change* and other node words in the control group (i.e. *marine environmental protection* and *maritime accident*) are not strong according to textual data.

Node word	Common collocate	Frequency (coll)
<i>Maritime security</i>	contribute	10
<i>Maritime cyber risk</i>	—	—
<i>Unlawful acts</i>	framework	7
<i>Piracy</i>	combat	39
<i>Armed robbery</i>	combat	12
<i>Human trafficking</i>	migration	11
<i>Smuggling</i>	combat	12
<i>Counter-terrorism</i>	united	11
	nations	11
	UN	10
	global	14

Underlying data source: IMO public website

Collocates of migration only

Collocates of
climate change only

Common collocates between climate change and migration

Search Term	migration	Occurrences	92,968 (0.02)	Texts	1/1,419	▼ Corpus	IMO	▼ Context	7	▼ Display Text
Index	File	Left		Node		Right				
755	International I, No. 18 (Geneva, 2012), Environmental degradation,	migration,				Internal displacement , and Rural Vulnerabilities in Tajikistan				
852	International I humanitarian consequences of climate change, including	migration				and displacement consequences. At the field level,				
1,719	International I with country offices. A systematic stock-take on	migration				and displacement activities is, however, planned for				
1,827	International I bgramme 257 programming to the linkages between	migration,				displacement and environmental factors. The HLD also				
2,198	International I face between forced displacement and international	migration				with the aim of encouraging States to				
2,269	International I e integration of protection principles. Climate change,	migration				and displacement The exact scope and scale				
2,270	International I The exact scope and scale of future	migration				and displacement as a result of climate				
2,271	International I predicted to be internal. However, some international	migration,				and displacement are inevitable and may also				
2,283	International I distress at sea; climate change, displacement and	migration;				and forced displacement and refugee protection and				

Search Term	migration	Occurrences	72,968 (0.02)	Texts	1/1,419	▼ Corpus	IMO	▼ Context	7	▼ Display Text
Index	File	Left		Node						Right
314	International I	as one 33 (i) The linkages between	migration,			environmental	degradation	and climate change. (ii) The		
353	International (10); Climate Change, Environmental degradation and		migration,			International Dialogue on Migration Series, No. 18				
755	International I, No. 18 (Geneva, 2012); Environmental degradation,		migration,			Internal Displacement, and Rural Vulnerabilities in Tajikistan				
1,857	International long climate change, environmental degradation and		migration.			UNEP, therefore, brings to this partnership its				
1,971	International ten climate change, environmental degradation, and		migration			in the Sahel aims at strengthening the				
2,080	International tras, climate change, environmental degradation and		migration			building partnerships, health challenges of migrant youth,				
2,448	International 10f climate change and environmental degradation on		migration			and vulnerable populations, in particular, children, adolescents				

Fig. 8 The concordance lines of *combat* as a common collocate of *climate change* and *armed robbery*. Underlying data source: IMO public website

Search Term		climate change	Occurrences	11/398 (0.03)	Texts	11/1,419	Corpus	IMO	Context	7	Display Text
Index	File	Left	Node	Right							
40	IMO Secretary	Goal 13. Take urgent action to <i>combat</i>	<i>climate change</i>	and its impacts* Goal 14. Conserve and							
164	Media Centre	Goal 5 (gender equality); Goal 13 (<i>combat</i>	<i>climate change</i>);	Goal 14 (use of the oceans, seas							
177	Media Centre	contribution to the world efforts to <i>combat</i>	<i>climate change</i> .	Commenting at the end of the Conference,							
192	Media Centre	contribution to the world efforts to <i>combat</i>	<i>climate change</i> .								
222	Media Centre	Goal 13. Take urgent action to <i>combat</i>	<i>climate change</i>	and its impacts* Goal 14. Conserve and							
234	Media Centre	Goal 13. Take urgent action to <i>combat</i>	<i>climate change</i>	and its impacts. The MEPC's work also							
238	Media Centre	its contribution to the fight to <i>combat</i>	<i>climate change</i> ,	including through the adoption of legally binding							
269	Media Centre	international agreement ever to <i>combat</i>	<i>climate change</i> ,	will take effect on 4 November 2016,							
302	Media Centre	in order to <i>combat</i> global warming and	<i>climate change</i> ;	the promotion of new technology for safety,							
344	Media Centre	Goal 5 (gender equality); Goal 13 (<i>combat</i>	<i>climate change</i>);	and Goal 14 (use of the oceans,							
Search Term		armed robbery	Occurrences	12/2,560 (0.03)	Texts	10/1,419	Corpus	IMO	Context	7	Display Text
Index	File	Left	Node	Right							
1,622	32-22.bt	national Maritime Organization, to <i>combat</i> piracy and	<i>armed robbery</i>	at sea by adopting measures, including those							
1,677	A.1025.bt	Maritime Organization, to actively <i>combat</i> piracy and	<i>armed robbery</i>	at sea by adopting measures, including those							
1,702	A.1025.bt	capacity of States to <i>combat</i> piracy and	<i>armed robbery</i>	against ships, States should endeavour to cooperate							
1,762	A1002(25).bt	with the Organization, to <i>combat</i> piracy and	<i>armed robbery</i>	at sea by adopting measures, including those							
1,793	A1025(26).bt	Maritime Organization, to actively <i>combat</i> piracy and	<i>armed robbery</i>	at sea by adopting measures, including those							
1,818	A1025(26).bt	capacity of States to <i>combat</i> piracy and	<i>armed robbery</i>	against ships, States should endeavour to cooperate							
1,863	A922(22).bt	prevent and <i>combat</i> incidents of piracy and	<i>armed robbery</i>	at sea, including through regional co-operation, and							
1,920	A979(24).bt	with the Organization, to <i>combat</i> piracy and	<i>armed robbery</i>	at sea by adopting measures, including those							
1,997	Media Centre	continue their efforts to <i>combat</i> piracy and	<i>armed robbery</i>	against ships off the coast of Somalia							
2,055	Media Centre	continue their efforts to <i>combat</i> piracy and	<i>armed robbery</i>	against ships off the coast of Somalia							
2,201	Media Centre	to international co-operation to <i>combat</i> piracy and	<i>armed robbery</i>	against ships with the recent announcement that							
2,444	MSC.Circ.443	measures to <i>combat</i> acts of piracy and	<i>armed robbery</i>	against ships and small craft at sea,							

Discussion and conclusion

Using corpus linguistic methods, textual data show that, except for the indirect link between climate change and maritime security via migration/displacement, the IMO narrative does not encapsulate the interlinkages between climate change and maritime security. Despite having interests and responsibility in offering solutions to tackle both climate change and maritime security, the IMO does not seem to narratively represent the two issues (and the impacts of the two issues) as something linked or something that could potentially be linked, except indirectly in the case of climate change-induced migration. It is worth noting that findings might be limited by the following methodological constraint: the span of ± 5 (chosen in order to stay within typical linguistic structures and to reduce noise) does not take into account a potential narrative between climate change and maritime security that might be developed across entire paragraphs.

This reveals the need to start serious discussions with the help of both natural scientists and social/political scientists in a bid to initiate a reflexion on the existence of links and dependencies between the two issues. The existing literature has shown that

the impacts of climate change on natural systems, such as a loss, or change in, marine biodiversity, can then reverberate on human, social and political systems, via economic slow-down, food insecurity, natural disasters, extreme weather events, forced displacements, vulnerability of coastal populations as well as the synergistic impacts of these processes. This can in turn increase the incentive to engage in maritime criminal activities (e.g. illegal fishing, piracy, human smuggling) as well as increase the risk of illegal immigration (e.g. Allison et al. 2009; Cinner et al. 2012; Cordner 2010; Jaspardo 2009; Jaspardo and Taylor 2008; Kaye 2012; Mazaris and Germond 2018; Perch-Nielsen et al. 2008; Pomeroy et al. 2016; Rahman 2012; Rahman and Tsamenyi 2010; Suárez de Vivero and Mateos 2017).

So long as actors tasked to tackle climate change concentrate on mitigation and adaptation (something that the IMO narrative seems to put forward), and so long as they do not include a reflexion on the impacts of damaged or threatened natural systems not only on food security, income and living conditions but also on the occurrence of (maritime) criminality, an important element of the puzzle will be missed. Our analysis has shown that this lack of interlinkages in narrative may be due to the very conceptualisation of climate change on the one

Fig. 9 The concordance lines of *combat* as a common collocate of *climate change* and *smuggling*. Underlying data source: IMO public website

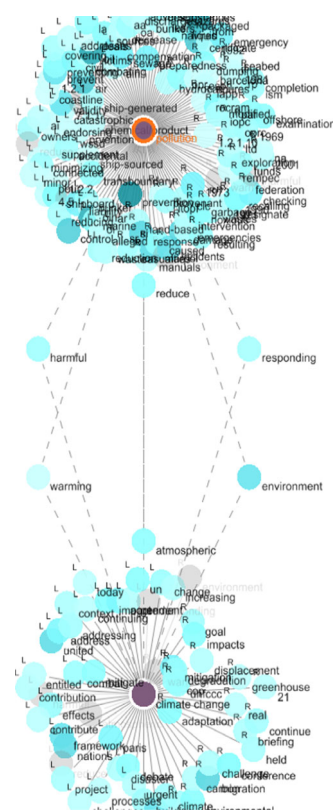
Search Term	climate change	Occurrences	11/398 (0.03)	Texts	11/1,419	Corpus	IMO	Context	7	Display Text
Index	File	Left	Node	Right						
40	IMO Secretary	Goal 13. Take urgent action to <i>combat</i>	<i>climate change</i>	and its impacts* Goal 14. Conserve and						
164	Media Centre	Goal 5 (gender equality); Goal 13 (<i>combat</i>	<i>climate change</i>);	Goal 14 (use of the oceans, seas						
177	Media Centre	contribution to the world efforts to <i>combat</i>	<i>climate change</i> .	Commenting at the end of the Conference,						
192	Media Centre	contribution to the world efforts to <i>combat</i>	<i>climate change</i> .							
222	Media Centre	Goal 13. Take urgent action to <i>combat</i>	<i>climate change</i>	and its impacts* Goal 14. Conserve and						
234	Media Centre	Goal 13. Take urgent action to <i>combat</i>	<i>climate change</i>	and its impacts. The MEPCs work also						
238	Media Centre	its contribution to the fight to <i>combat</i>	<i>climate change</i> ,	including through the adoption of legally binding						
269	Media Centre	international agreement ever to <i>combat</i>	<i>climate change</i> ,	will take effect on 4 November 2016,						
302	Media Centre	in order to <i>combat</i> global warming and	<i>climate change</i> ;	the promotion of new technology for safety,						
344	Media centre -	Goal 5 (gender equality); Goal 13 (<i>combat</i>	<i>climate change</i>);	and Goal 14 (use of the oceans,						
381	rmt2016_en.t	13, to take urgent action to <i>combat</i>	<i>climate change</i>	and its impacts. Of particular relevance in						

Search Term	smuggling	Occurrences	12/327 (0.03)	Texts	10/1,419	Corpus	IMO	Context	7	Display Text
Index	File	Left	Node	Right						
51	32-22.bt	efforts undertaken to prevent and <i>combat</i> the	<i>smuggling</i>	of drugs, psychotropic substances and precursor chemicals,						
57	33-19.bt	personnel to <i>combat</i> the scourge of drug	<i>smuggling</i> .	7.22 Noting the specific proposals with respect						
105	39-16.bt	to improve their ability to <i>combat</i> drug	<i>smuggling</i> ,	while providing enhanced facilitation. Such arrangements could						
109	A.1027(26).bt	should not undermine efforts to <i>combat</i> alien	<i>smuggling</i>	or human trafficking incidents, RECOGNIZING that stowaway						
110	A.871(20).bt	should not undermine efforts to <i>combat</i> alien	<i>smuggling</i>	or human trafficking incidents, RECOGNIZING that stowaway						
114	A.985(24).bt	efforts undertaken to prevent and <i>combat</i> the	<i>smuggling</i>	of drugs, psychotropic substances and precursor chemicals,						
117	A1027(26).bt	should not undermine efforts to <i>combat</i> alien	<i>smuggling</i>	or human trafficking incidents, RECOGNIZING that stowaway						
123	A985(24).bt	efforts undertaken to prevent and <i>combat</i> the	<i>smuggling</i>	of drugs, psychotropic substances and precursor chemicals,						
127	A985-Rev-1(2	efforts undertaken to prevent and <i>combat</i> the	<i>smuggling</i>	of drugs, psychotropic substances and precursor chemicals,						
199	International I	practices to effectively <i>combat</i> human trafficking and	<i>smuggling</i>	of migrants, built upon the following principles:						
206	International I	expense 27 The UNODC Toolkit to <i>Combat</i>	<i>Smuggling</i>	of Migrants (2010) demonstrates how, in many						
209	International I	trafficking in persons. The Toolkit to <i>Combat</i>	<i>Smuggling</i>	of Migrants 30 (2010) offers similar guidance and						

Fig. 10 Common collocates between *climate change* and *pollution*

Collocates of
pollution only

Collocates of
climate change only



Common collocates
between climate change
and pollution

hand and of maritime security on the other hand. In both cases, textual data shows that the vocabulary employed to conceptualise the two issues is very technical, ranging from institutional processes and frameworks, to policy requirements and settings, to generic calls for action and coordination. The specific framing of climate change within institutional processes and policy settings rather than a cause/consequence process

involving issues at the societal level, whereas maritime security is conceptualised as a series of illegal practices that must be tackled, certainly explains the current lack of narrative linking the two issues. The origin of this technicality can be traced back to the IMO's traditional role which is to improve the safety of the maritime shipping industry. In this organisational context, climate change and maritime security

Fig. 11 Concordance lines of *environment*, a common collocate of *climate change* and *pollution*. Underlying data source: IMO public website

Search Term climate change		Occurrences 18/398 (0.05)	Texts 6/1,419	Corpus IMO	Context 7	Display Text
Index	File	Left	Node	Right		
22	About IMO - facing the world today increasing world population;	climate change;	threats to the environment;	unsustainable exploitation of		
23	About World facing the world today increasing world population;	climate change;	threats to the environment;	unsustainable exploitation of		
41	International Association of Southeast Asian Nations CCEMA	Climate Change;	Environment and migration Alliance CEB United Nations			
54	International I links the links between migration, the environment and	climate change;	and has pioneered operational responses, research, policy			
55	International I1 Its 2009 publication migration, Environment and	Climate Change;	Assessing the Evidence was one of the			
56	International I a Compendium of IOMs Activities in migration,	Climate Change	and the Environment (2009). IOM has supported			
57	International I can be found in, for example: Environment,	climate change	and migration: IOMs approach and activities, climate			
59	International Ieva, 2008); Assessing the Evidence: Environment,	Climate Change	and migration in Bangladesh (Dhaka, 2010); Climate			
71	International Iing refugees, to development, the nexus between	climate change;	the environment and Chapter 7: International Organization for			
79	International I interactive discussion on the social dimensions of	climate change	entitled Climate Change, Environment degradation and Migrants			
80	International I the social dimensions of climate change entitled	Climate Change;	Environment degradation and Migrants as Actors of			
89	International I and education. UNEP is part of the	Climate Change;	Environment and migration Alliance (CCEMA), a multi-stakeholder			
90	International I nsiderations to the environment, development and	climate change	agendas, and vice versa. CCEMA was founded			
122	International I regional migration trends, and on the environment,	climate change;	gender, health, labour migration, policy and international			
239	Media Centre facing the world today increasing world population;	climate change;	threats to the environment;	unsustainable exploitation of		
280	Media Centre s improvement of economic and social conditions,	climate change;	protecting the arctic environment and strengthening the			

Search Term pollution		Occurrences 107/2,384 (0.29)	Texts 55/1,419	Corpus IMO	Context 7	Display Text
Index	File	Left	Node	Right		
52	1052(27).bt	and effect rescue if necessary, 7 prevent	pollution	of the environment, 8 maintain adequate stability,		
223	1054(27).bt	taking measures to prevent, reduce and control	pollution	of the marine environment, States shall act		
264	32-22.bt	rescue persons in distress or prevent catastrophic	pollution	of the marine environment amidst extreme conditions		
280	34.bt	with pollution prevention requirements Prevention of	pollution	of the marine environment and anti-pollution procedures		
281	34.bt	the precautions to be taken to prevent	pollution	of the marine environment Anti-pollution procedures and		
282	34.bt	the protection of the marine environment against	pollution	by the ship, and that a chief		
284	34.bt	cargo 7 methods and aids to prevent	pollution	of the marine environment by ships 8		
285	34.bt	with pollution prevention requirements Prevention of	pollution	of the marine environment and anti-pollution procedures		
286	34.bt	the precautions to be taken to prevent	pollution	of the marine environment Anti-pollution procedures and		
287	34.bt	precautions and contribute to the prevention of	pollution	of the marine environment Knowledge of the		
288	34.bt	the precautions to be taken to prevent	pollution	of the marine environment Knowledge of the		
289	34.bt	to ensure safety of operations and avoid	pollution	of the marine environment Deviations from the		
290	34.bt	to ensure safety of operations and avoid	pollution	of the marine environment Deviations from the		
291	34.bt	with pollution prevention requirements Prevention of	pollution	of the marine environment Knowledge of the		
292	34.bt	the precautions to be taken to prevent	pollution	of the marine environment Anti-pollution procedures and		
295	34.bt	cargo 7 methods and aids to prevent	pollution	of the environment by ships 8 knowledge		

issues are likely to be associated to threats to maritime shipping, hence the problem-solving/technical approach of the IMO consisting in setting up rules, regulations, guidelines and agenda as well as promoting multilateral responses to transnational threats. This also seems to fit with the “technocratic and industry-oriented” nature of the IMO secretariat discussed by Campe (2009: 144).

Our findings have practical implications for both academics and practitioners. This article reveals the need for academics to find ways to conceptualise these dependencies between climate change and maritime security and to quantify the synergistic links between the two issues. It is crucial to work on better integrating indicators reflecting ecological risk (e.g. extreme weather events, loss of biodiversity, velocity of climate change), social vulnerability (e.g. capacity to adapt), exposure to impacts (e.g. localization on the global grid), economic consequences of climate change as well as maritime criminality indexes. Practitioners will benefit from such scientific advances, but they are also invited to move beyond an institutional processes/policy setting narrative so as to further account for the interlinkages between climate change and maritime security. Linking maritime security and climate change parallels the move from a problem-solving approach to one that deals with the underlying causes of maritime criminality, of which climate change is but one. This would help pushing forward the climate change-maritime security nexus agenda forward, which would eventually improve current ocean governance practices.

Acknowledgments We would like to thank the Associate Editor and the journal's three anonymous reviewers for their helpful comments. We also would like to thank Professor Antonios Mazaris of the Aristotle University of Thessaloniki for his advice.

Funding Research underlying this article was supported in part by a grant from the Department of Politics Philosophy and Religion at Lancaster University with additional support by the ESRC-funded Centre for Corpus Approaches to Social Science (grant references: ES/K002155/1 and ES/R008906/1).

Open Access This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made.

References

- African Union (2012) 2050 Africa's integrated maritime Strategy (2050 AIM STRATEGY). Presented by Ambassador Dr Namira Negm, Addis Ababa. https://au.int/sites/default/files/newsevents/workingdocuments/33832-wd-african_union_3-1.pdf. Accessed 28.06.2018
- Allison EH, Perry AL, Badjeck MC, Neil Adger W, Brown K, Conway D, Halls AS, Pilling GM, Reynolds JD, Andrew NL (2009) Vulnerability of national economies to the impacts of climate change on fisheries. *Fish Fish* 10:173–196
- Arora-Jonsson S (2011) Virtue and vulnerability: discourses on women, gender and climate change. *Global Environ. Change* 21(2):744–751
- Barnett J (2003) Security and climate change. *Glob Environ Chang* 13:7–17
- Barnett J, Adger WN (2007) Climate change, human security and violent conflict. *Polit Geogr* 26:639–655
- Brezina V, McEnery T, Wattam S (2015) Collocations in context: a new perspective on collocation networks. *Int J Corpus Linguis* 20(2): 139–173
- Brezina V, Timperley M, Gablasova D, McEnery T (in prep) #LancsBox: A new-generation corpus analysis tools for researchers, students and teachers
- Bueger C (2014) Piracy studies: academic responses to the return of an ancient menace. *Coop Confl* 49(3):406–416
- Campe S (2009) The secretariat of the international maritime organization: a tanker for tankers. In: Biermann F, Siebenhüner B (eds) *Managers of global change: the influence of international environmental bureaucracies*. MIT Press, Cambridge, pp 143–168
- Cinner JE, McClanahan TR, Graham NAJ, Daw TM, Maina J, Stead SM, Wamukota A, Brown K, Bodin Ö (2012) Vulnerability of coastal communities to key impacts of climate change on coral reef fisheries. *Global Environ Change* 22(1):12–20
- Commission of the European Communities (2009) White Paper: Adapting to climate change: Towards a European framework for action. COM (2009) 147/4, Brussels
- Cordner L (2010) Rethinking maritime security in the Indian Ocean region. *Journal of the Indian Ocean Region* 6:67–85
- Council of the European Union (2014) European Union Maritime Security Strategy, Brussels, 24 June 2014, 11205/14
- Department of Defense (2015) National Security Implications of Climate-Related Risks and a Changing Climate. <http://archive.defense.gov/pubs/150724-congressional-report-on-national-implications-of-climate-change.pdf?source=govdelivery>. Accessed 28.06.2018
- Ferguson J (1990) *The anti-politics machine: development, Depoliticization and bureaucratic power in Lesotho*. Cambridge University Press, Cambridge
- Firth J (1957) *Papers in linguistics*. Oxford University Press, Oxford
- Firth J (1968) A synopsis of linguistic theory 1930–1955. In: Palmer FR (ed) *Selected papers of J. R. Firth 1952–59*. Indiana University Press, Bloomington, pp 1–32
- Flowerdew J (1996) Concordancing in language learning. In: *The Power of Call*. Athelstan, Houston, pp 97–113
- French Government (2015) National Strategy for Security of Maritime Spaces. Adopted by the inter-ministerial sea committee on 22 October 2015. https://www.gouvernement.fr/sites/default/files/contenu/piece-jointe/2016/01/strategie_nationale_de_surete_des_espaces_maritimes_en_national_strategy_for_the_security_of_maritime_areas.pdf. Accessed 28.06.2018
- Gemenne F, Barnett J, Adger WN, Dabelko GD (2014) Climate and security: evidence, emerging risks, and a new agenda. *Clim Chang* 123:1–9
- Germond B (2015) The geopolitical dimension of maritime security. *Mar Policy* 54:137–142
- Gleditsch NP (2012) *Whither the weather? Climate change and conflict*. Sage Publications Sage UK, London
- HM Government (2014) The UK National Strategy for Maritime Security. Presented to Parliament by the Secretary of State for Defence by Command of Her Majesty, May 2014, Cm 8829
- Hoey M (1991) *Pattern of Lexis in text*. Oxford University Press, Oxford
- Hsiang SM, Burke M (2014) Climate, conflict, and social stability: what does the evidence say? *Clim Change* 123:39–55
- Hunston S (2002) *Corpora in applied linguistics*. Cambridge University Press, Cambridge

- IMO website, About page. <http://www.imo.org/en/About/Pages/Default.aspx>. Accessed 03.07.2018
- Jasparro C (2009) Environmental threats to security, stability, and US interests in southern Africa: opportunity knocks-time for a comprehensive region defense environmental international cooperation and environmental security assistance Strategy. DTIC Document
- Jasparro C, Taylor J (2008) Climate change and regional vulnerability to transnational security threats in Southeast Asia. *Geopolitics* 13:232–256
- Kaye S (2012) Climate change and maritime security. In: Warner R, Schofield C (eds) *Climate change and the ocean*. Edward Elgar Publishing, Cheltenham and Northampton, pp 153–165
- Mazaris A, Germond B (2018) Bridging the gap between climate change and maritime security: towards a comprehensive framework for planning. *Sci Total Environ* 635C:1076–1080
- McEnery T, Xiao R, Tono Y (2006) *Corpus-based language studies: an advanced resource book*. Taylor & Francis, New York
- Parsons RJ (2010) Climate change: the hottest issue in security studies? *Risk, Hazards & Crisis in Public Policy* 1:87–116
- Perch-Nielsen LS, Bättig BM, Imboden D (2008) Exploring the link between climate change and migration. *Clim Chang* 91:375–393
- Pomeroy R, Parks J, Mrakovcich KL, LaMonica C (2016) Drivers and impacts of fisheries scarcity, competition, and conflict on maritime security. *Mar Policy* 67:94–104
- Rahman C (2012) The implications of climate change for maritime security. In: Warner R, Schofield C (eds) *Climate change and the ocean*. Edward Elgar Publishing, Cheltenham and Northampton, pp 167–199
- Rahman C, Tsamenyi M (2010) A strategic perspective on security and naval issues in the South China Sea. *Ocean Dev Int Law* 41:315–333
- Scheffran J, Brzoska M, Kominek J, Link P, Schilling J (2012) Climate change and violent conflict. *Science* 336:869–871
- Scott SV (2008) Securitizing climate change: international legal implications and obstacles. *Camb Rev Int Aff* 21:603–619
- Scott SV (2012) The securitization of climate change in world politics: how close have we come and would full securitization enhance the efficacy of global climate change policy? *Review of European Community & International Environmental Law* 21:220–230
- Scott M, Tribble C (2006) *Textual patterns: key words and Corpus analysis in language education*. John Benjamins, Amsterdam
- Sinclair J (1991) *Corpus, concordance, collocation*. Oxford University Press, Oxford
- Stubbs M (1995) Collocations and semantic profiles: on the cause of the trouble with quantitative methods. *Function of Language* 2/1:1–33
- Suárez de Vivero JL, Mateos JCR (2017) Forecasting geopolitical risks: oceans as source of instability. *Mar Policy* 75:19–28
- Trombetta MJ (2008) Environmental security and climate change: analysing the discourse. *Camb Rev Int Aff* 21:585–602
- UN Security Council (2007) Security council holds first-ever debate on impact of climate change, SC/9000, 17 April. <http://www.un.org/News/Press/docs/2007/sc9000.doc.htm>. Accessed 03.07.2018
- Von Lucke F, Wellmann Z, Diez T (2014) What's at stake in securitising climate change? Towards a differentiated approach. *Geopolitics* 19: 857–884